DEFTR

BROADBAND ETHERNET
FREQUENCY TRANSLATOR
OWNER'S MANUAL

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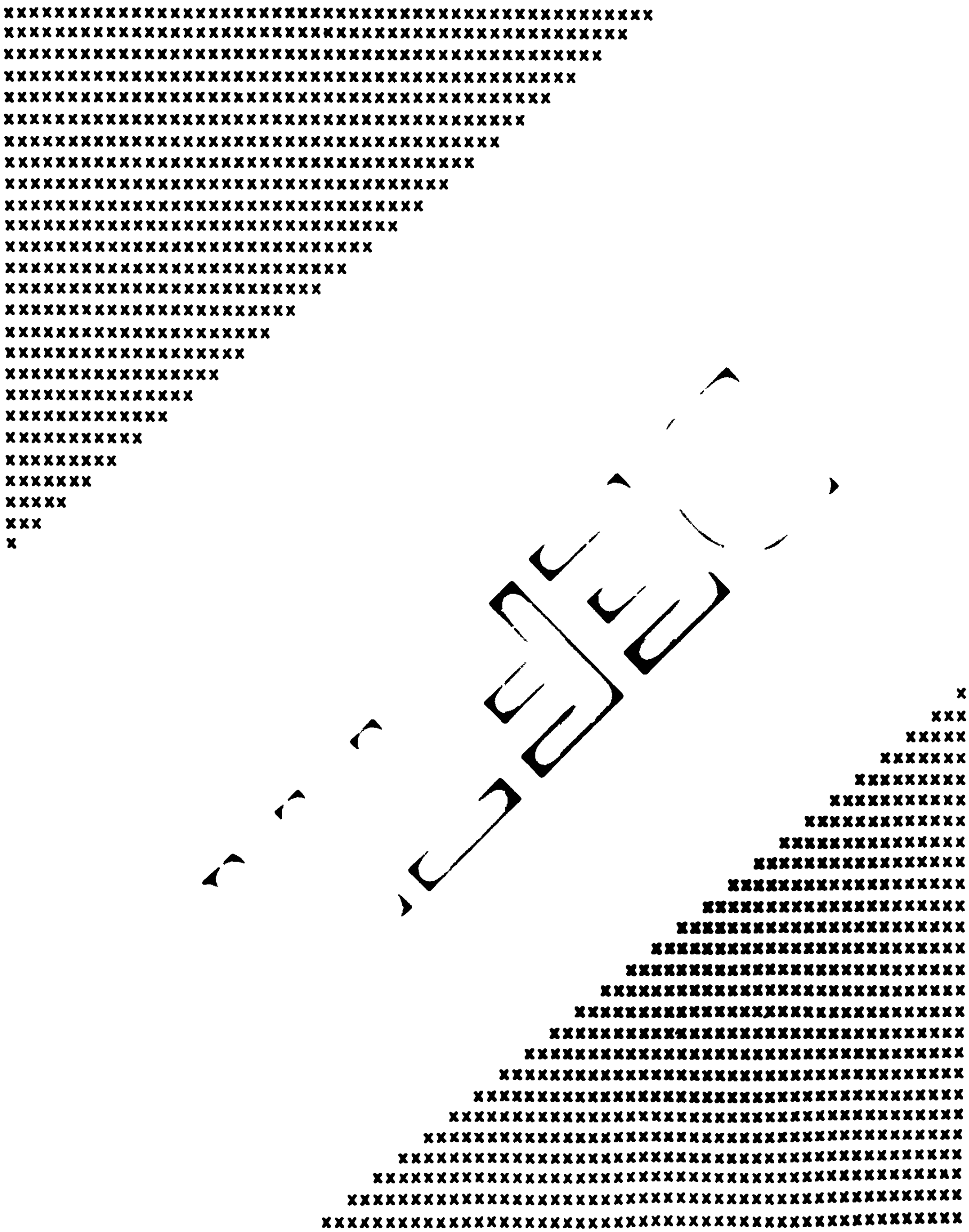

EK-FRETR-OM-001

Networks • Communications

DEFTR Broadband Ethernet Frequency Translator

Owner's Manual

Digital Equipment Corporation

1st Edition, June 1985

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This equipment generates, uses, and may emit radio frequency energy. The equipment has been type tested with a Class A computing device and has been found to comply with Part 15 of FCC Rules, which is designed to provide reasonable protection against such radio frequency interference when operated in a commercial environment. Operation of this equipment in a residential area may cause interference, in which case the user at his own expense may be required to take measures to correct the interference.

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DEFTR			

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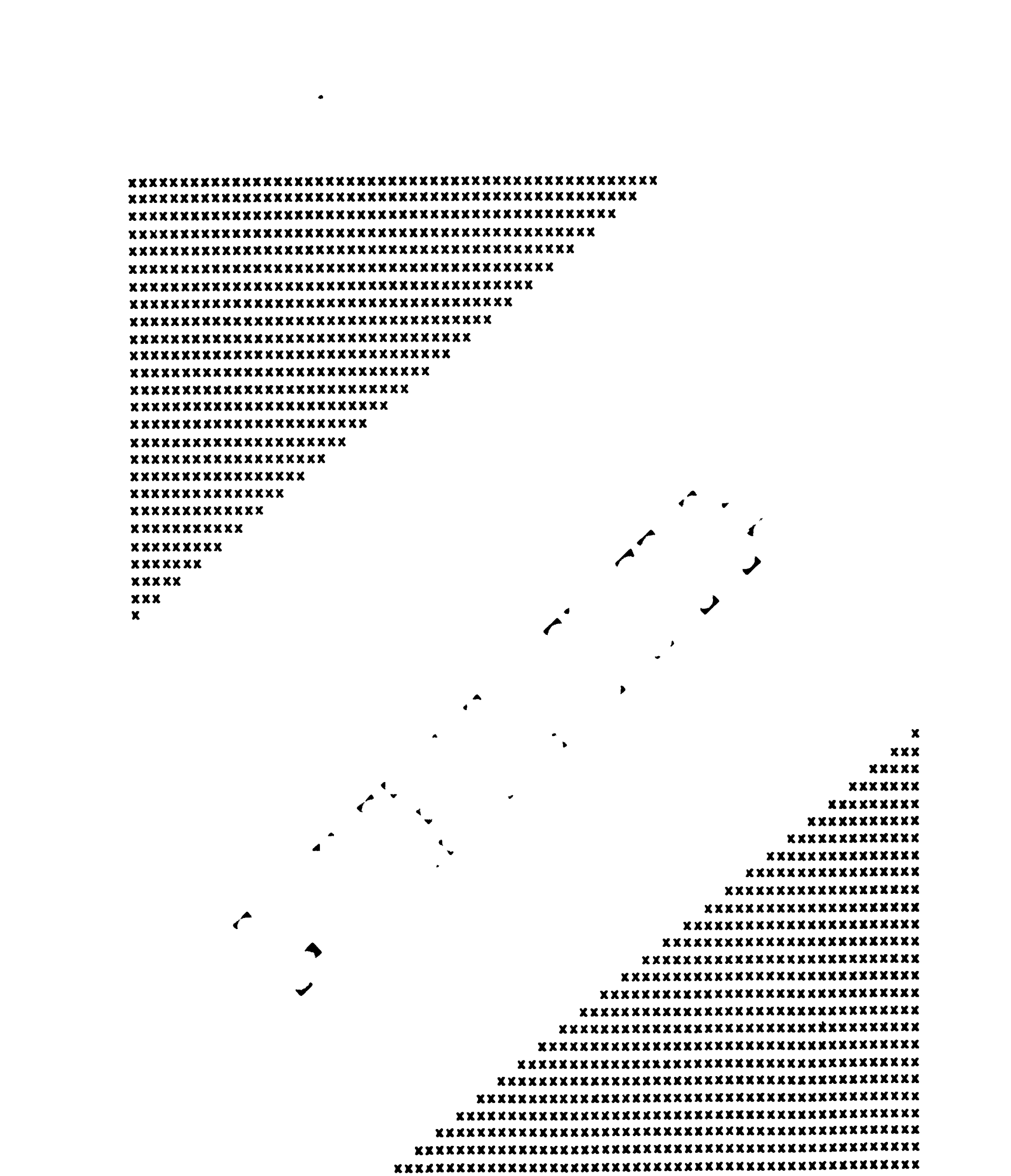
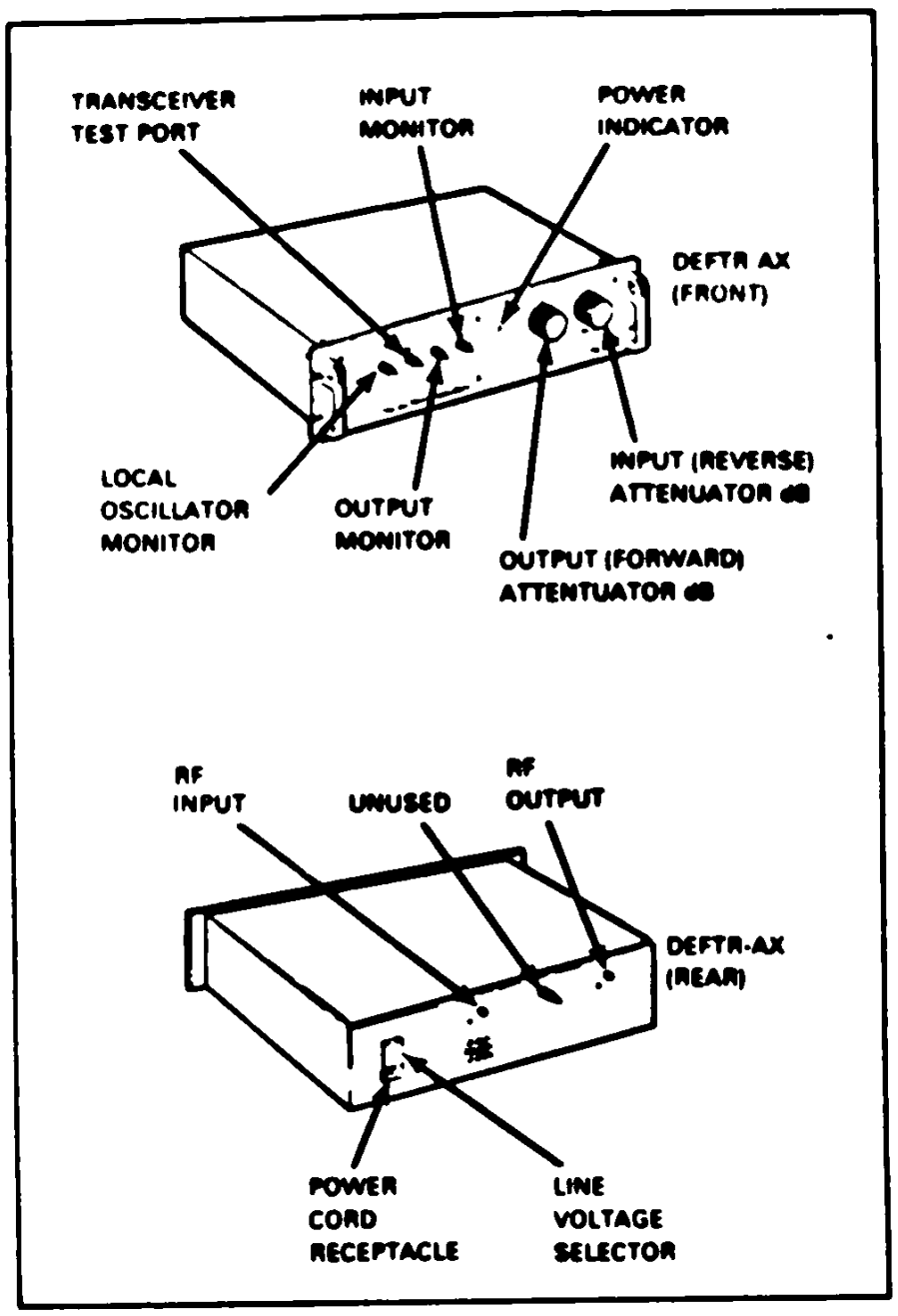


1.

Introducing DEFTR

1.1 GENERAL

This manual contains instructions for the installation and checkout of the DIGITAL Broadband Ethernet Frequency Translator model DEFTR-AX*.



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NOTE: For definitions of the DEFTR controls and connectors, see Appendix A in this manual.

*The letter "A" or "B" will appear in place of the "X" in the model designation to signify the following frequency translator input voltages:

Model	Input Voltage
DEFTR-AA	120 Vac
DEFTR-AB	240 Vac

1.2 FUNCTION

- The DEFTR broadband Ethernet frequency translator is used in conjunction with the DIGITAL broadband Ethernet transceivers (DECOM-BA and DECOM-BB) to create an Ethernet channel in single-cable broadband networks

- It receives signals transmitted by the DECOM-BA or DECOM-BB transceivers, translates the signals to a higher frequency, transposes the signals, and retransmits them to the transceivers

1.3 INSTALLATION

- You do not need to know how the Ethernet network functions to install the frequency translator

- Follow the installation procedures in this manual to connect ac power and the RF (radio frequency) input/output cables to the unit

- To verify whether the frequency translator can handle data transmissions after installation, you may need the help of the network manager and/or system manager to perform the checkout procedures in Chapter 5

- Follow the steps in this manual in sequence. It should take you about one hour to unpack and install the unit

CAUTION To prevent damage to the unit, do not plug in the power cord until you are so directed

1.4 RELATED DOCUMENTS

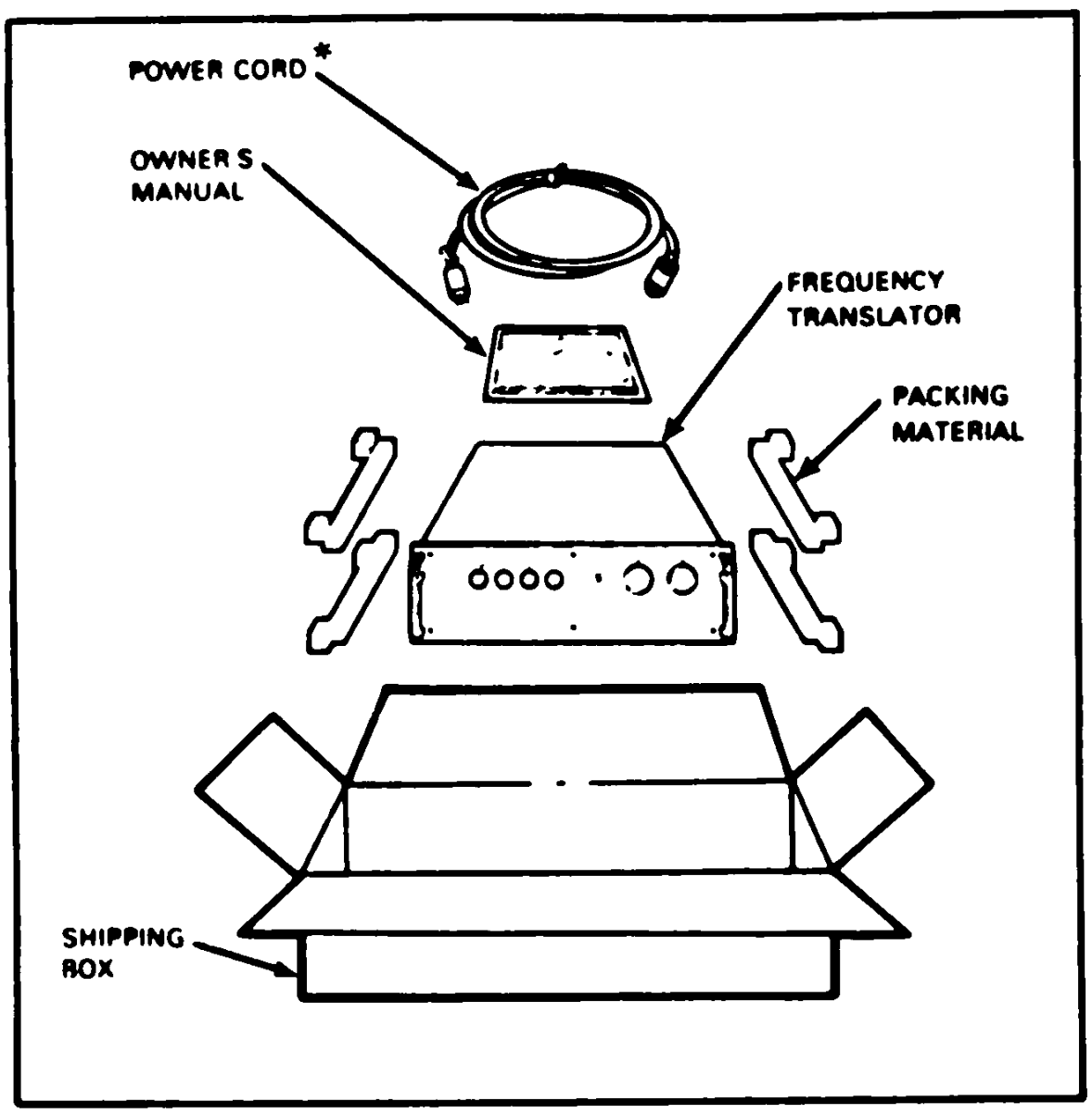
Title	Document Number
DECOM Broadband Ethernet Transceiver Owner's Manual	EK-OOBET-OM
DECOM Broadband Ethernet Transceiver Technical Manual	EK-OOBET-TM
DEFTR Broadband Ethernet Frequency Translator Technical Description	EK-FRETR-TD
Broadband Ethernet Channel Specification and Certification Guide	EK-00BEC-SM
The Ethernet Specifications	AA-K759X*-TK

*The letter 'X' indicates the version of the document

2.

Unpacking DEFTR

1. Unpack the box and check the unit for damage.



*POWER CORD FOR DEFTR-AB COMES IN ACCOMPANYING COUNTRY KIT DEBBK-AX, WHERE "X IDENTIFIES THE COUNTRY

MKV85-1120

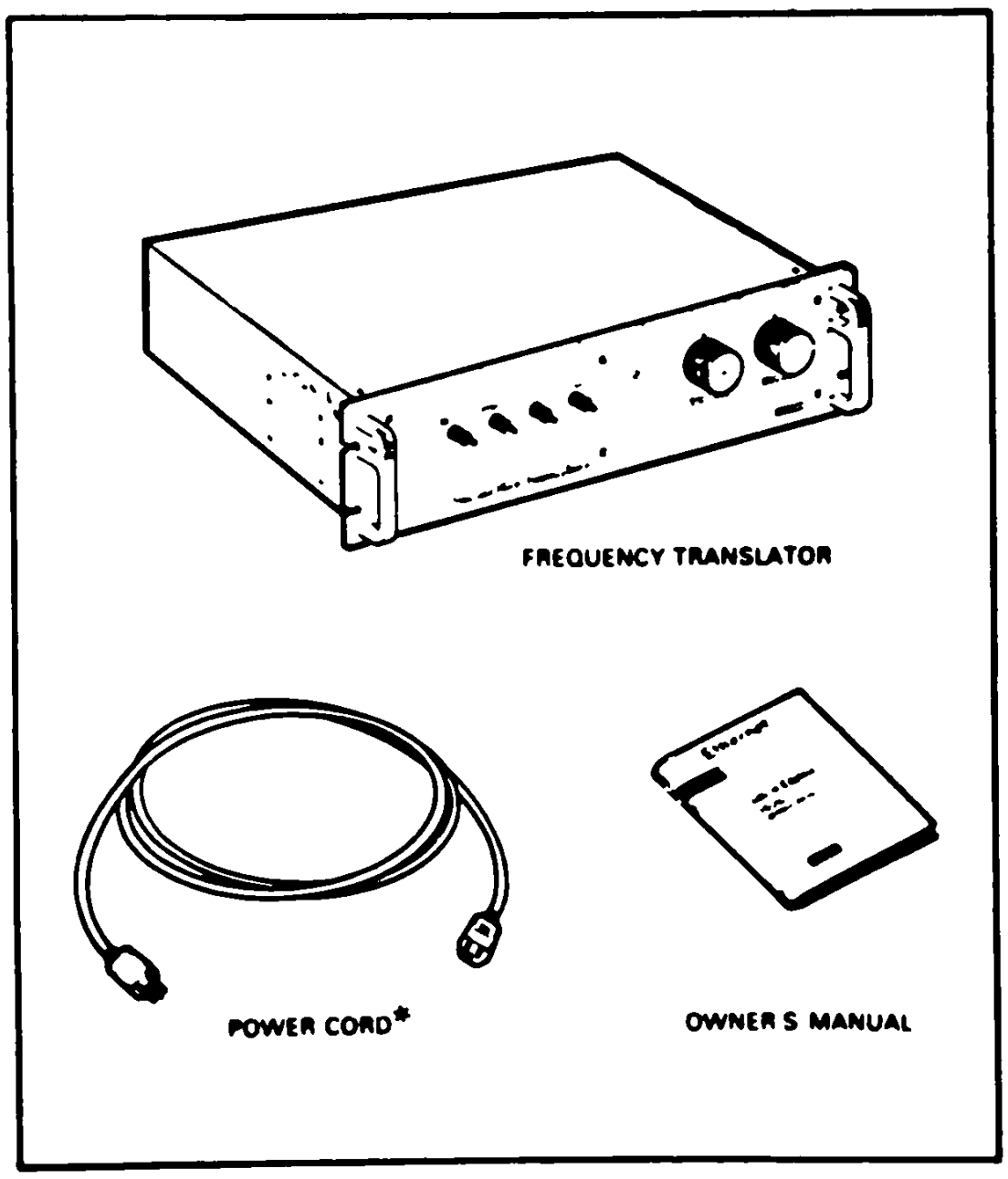
IN CASE OF DAMAGE:

- Stop unpacking.
- Contact your sales representative and delivery agent.

NOTE: Save the box and packing material in case the unit needs to be returned.

10

2. Check that you have the following parts:



*POWER CORD FOR DEFTR-AB COMES IN ACCOMPANYING COUNTRY KIT DEBBK AX WHERE "X IDENTIFIES THE COUNTRY

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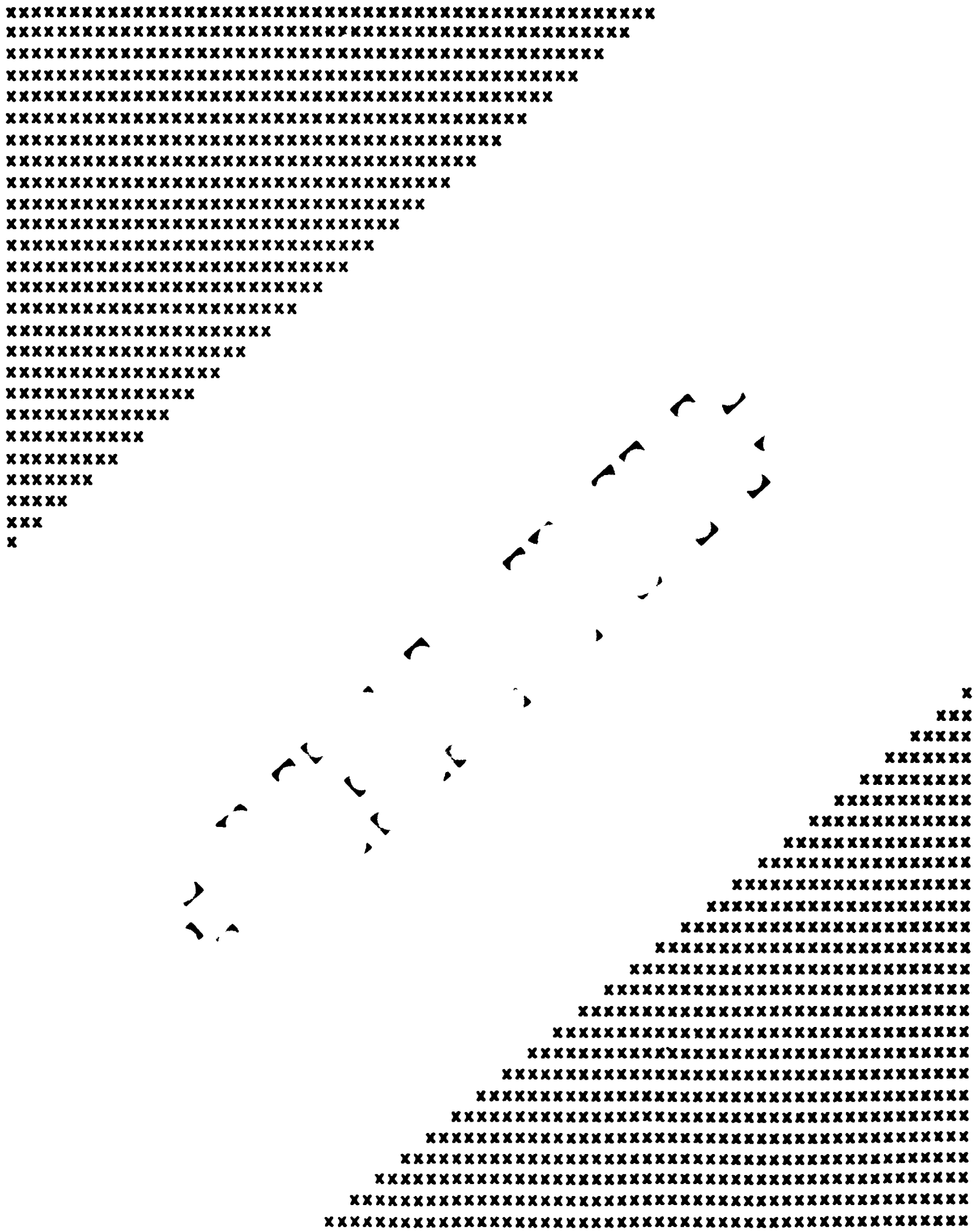
IF PARTS ARE MISSING:

- Identify missing part(s).
- Call your sales representative.



3.

Preparing DEFTR

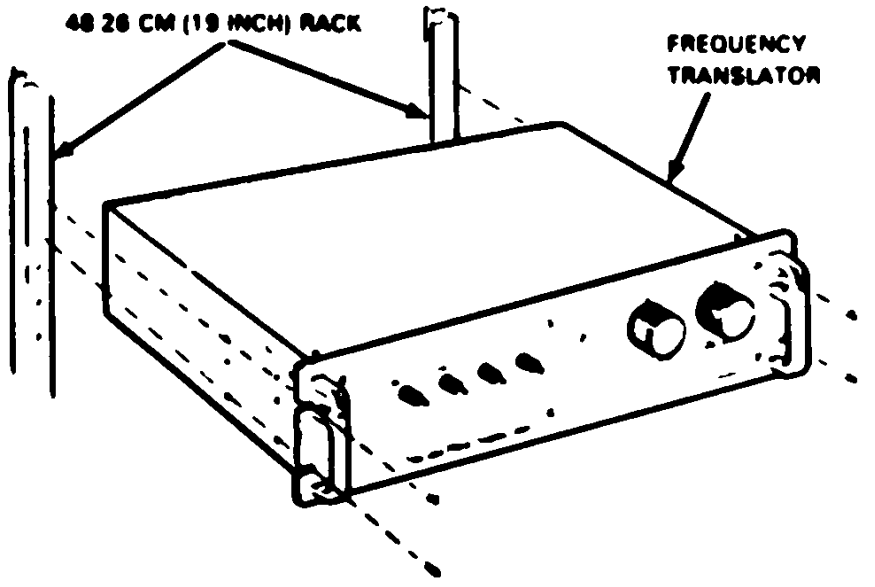
3.1 PLACING FREQUENCY TRANSLATOR

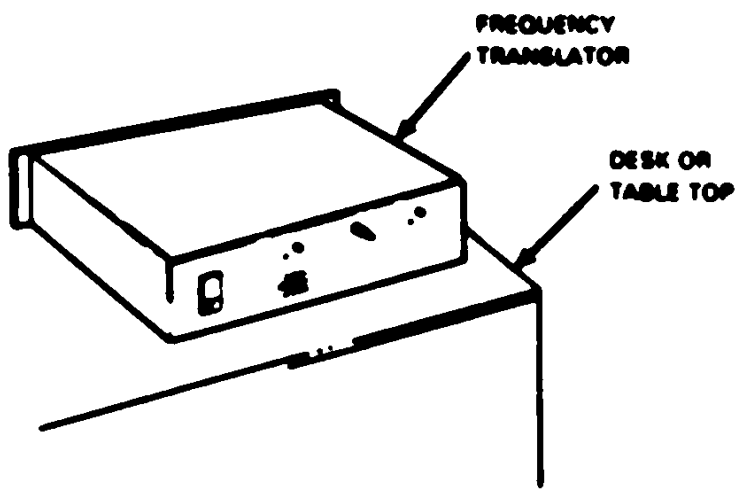
1. Select the headend location of the cable plant within reach of an ac power source.

2. Mount the frequency translator in a standard 48.26 cm (19 inch) rack or on top of a desk or table at this location.

NOTE: Allow at least 15.24 cm (6 inches) in the rear and 2.54 cm (1 inch) on each side of the unit for air circulation.

WARNING: ***The DEFTR frequency translator has been certified by the Canadian Standards Association (CSA) as a system component. CSA has not tested the safety of the DEFTR translator with the use of other components in the rack.***





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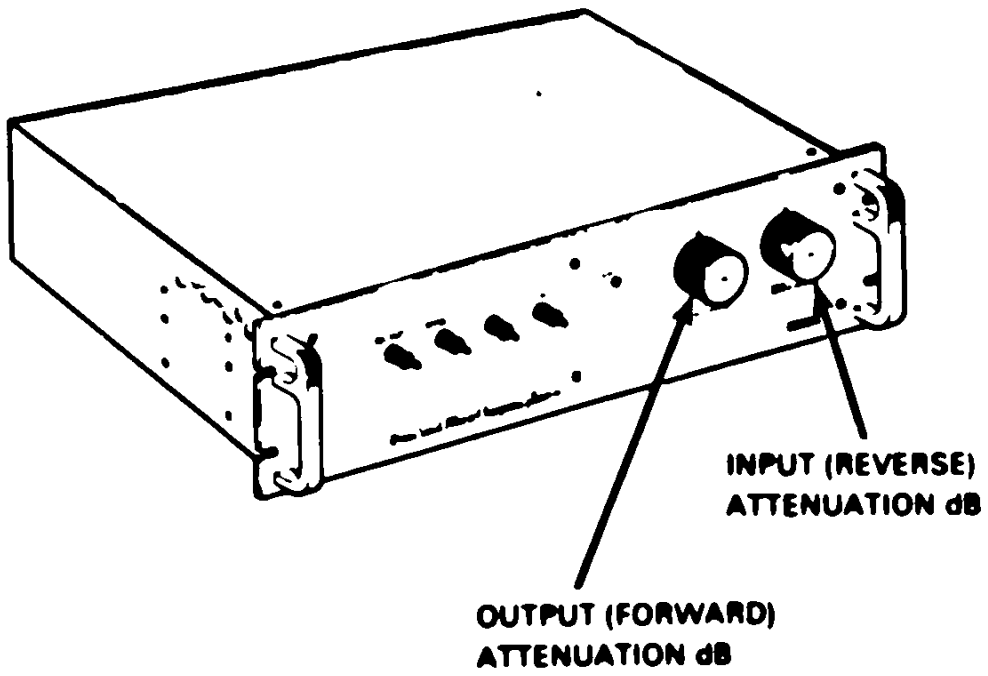
3.2 CABLING GUIDELINE

Make sure that the RF cable length from the DEFTR frequency translator to any DECOM transceiver does not exceed 1900 m (6234 ft).

3.3 PREINSTALLATION STEPS

1 Check that the network in which the frequency translator is being installed has been certified according to the *Broadband Ethernet Channel Specification and Certification Guide* (EK-00BEC-SM) See your network manager to verify that the network has been certified according to this specification

2. Set the INPUT (Reverse) and OUTPUT (Forward) attenuators to the appropriate dB settings See your network manager for the values, or use the procedures in Appendix B to determine the attenuator settings.



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4.

Installing DEFTR

4.1 CONNECTING POWER

1 Find the open slot in the line voltage selector unit at the rear of the frequency translator (See next page.)

2. Check that the voltage shown in the open slot is correct for your ac line voltage 120 Vac or 240 Vac

If:	Then:
Correct voltage	Go to Step 8.
Incorrect voltage	Go to Step 3.

3. To change the voltage, open the door of the line voltage selector unit.

NOTE To open the door, insert the end of a screwdriver into the small slot at the top of the door and carefully pry the door open.

4 Pull out the voltage selector drum and rotate the drum to the correct voltage. 120 Vac or 240 Vac

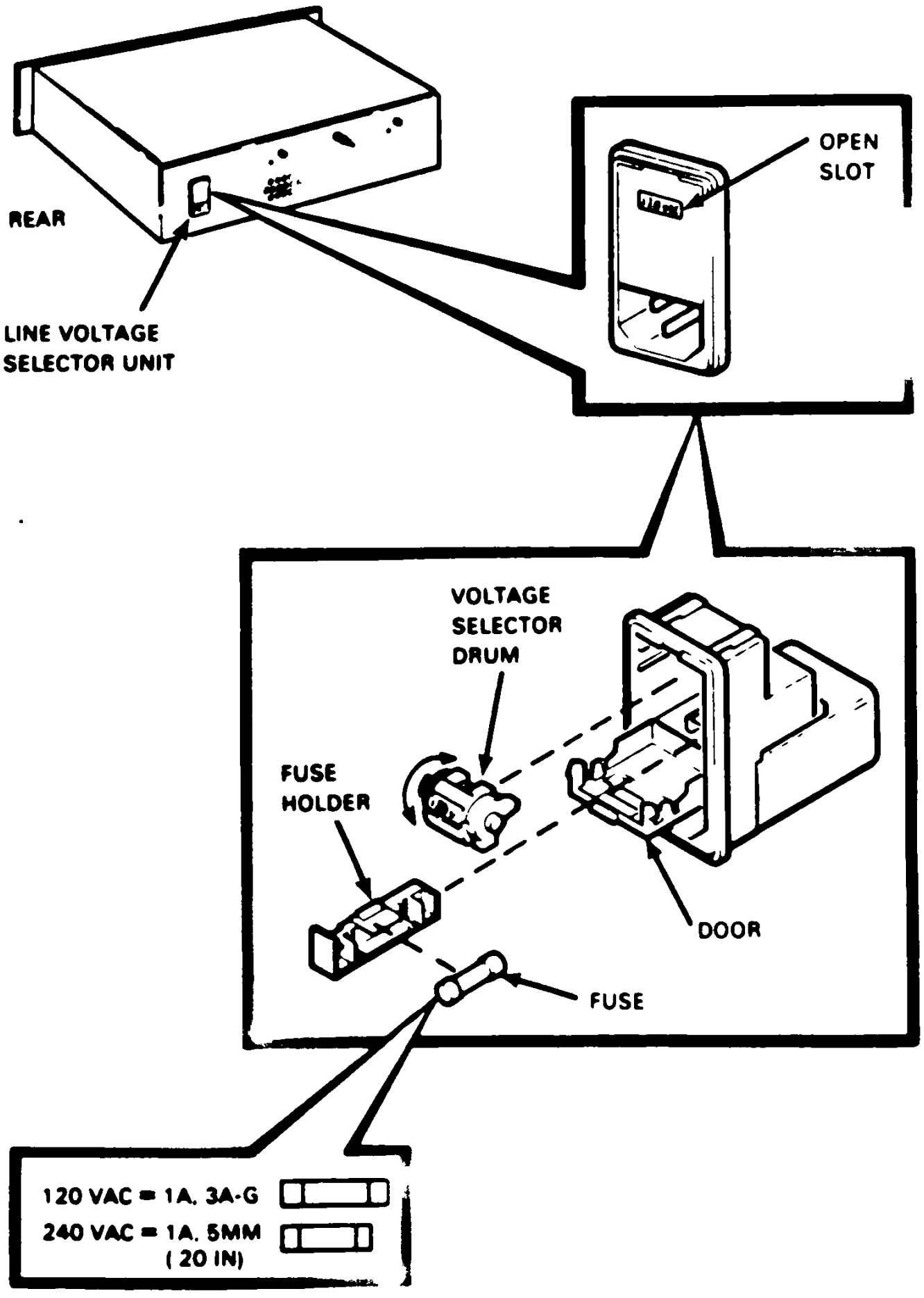
5 Re-insert the drum.

6. Pull out the fuse holder and check that the fuse is the correct type for the voltage selected.

   Replace the fuse if it is the incorrect type Contact your sales representative if you do not have a replacement fuse.

7. Carefully close the door of the voltage selector unit Be sure that it is snapped shut.

CAUTION: Incorrect voltage selection can damage the unit.



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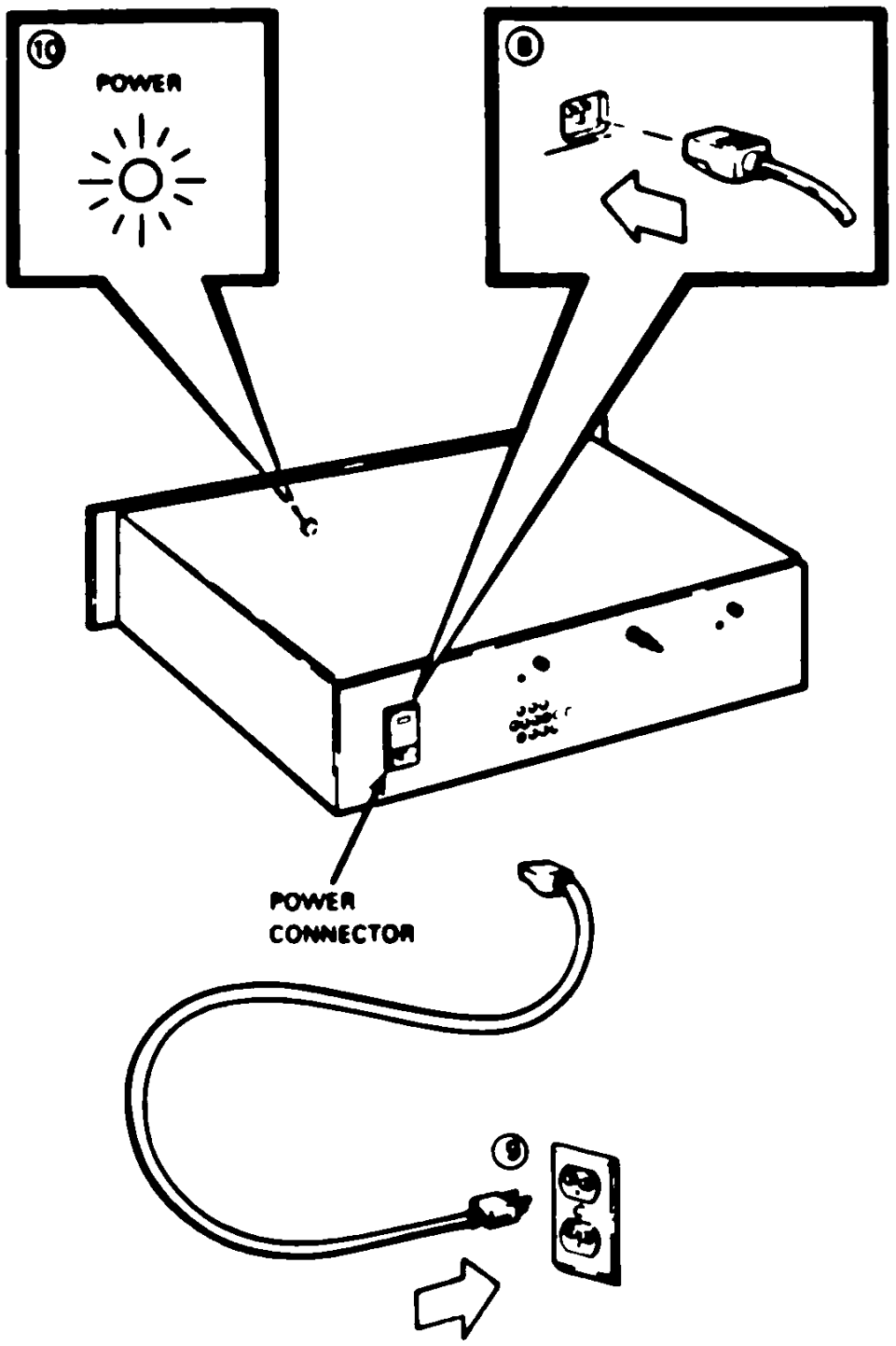
8. Plug the power cord into the frequency translator.

9. Plug the power cord into the ac power source.

10. Check that the POWER indicator on the front panel is ON.

    If the POWER indicator is not ON, unplug the power cord and check the fuse. Replace it, if blown. Contact your sales representative if you do not have a replacement fuse.



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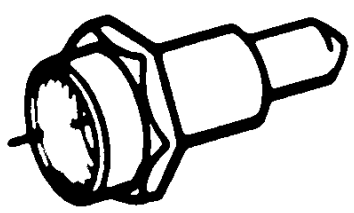
4.2 CONNECTING CABLES

1. Check that the INPUT (Reverse) and OUTPUT (Forward) attenuators on the front panel are set to the proper values. See Section 3.3 (Step 2).

2. Unscrew the 75-ohm terminators from the RF INPUT and RF OUTPUT connectors on the rear of the frequency translator. Save these terminators for possible future use.

NOTE: Do not remove the other terminators unless so instructed.



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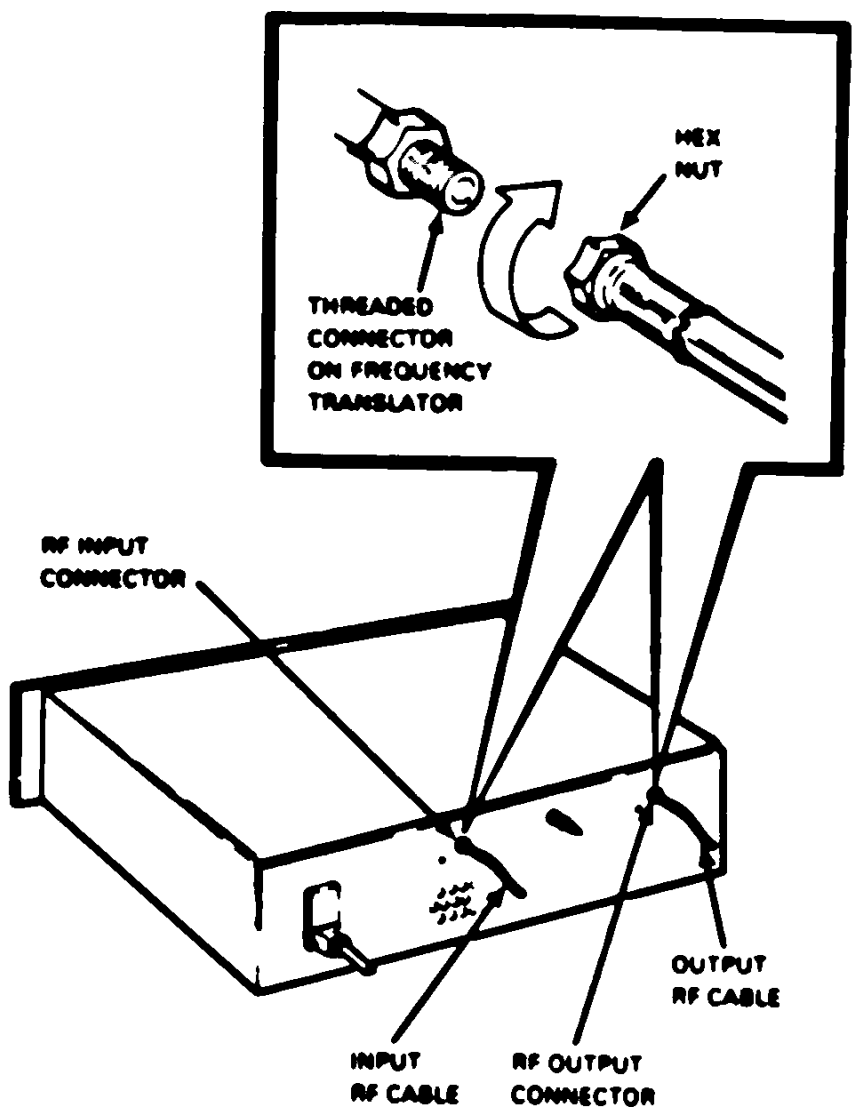
NOTE: The TR-75F male F terminators are used to terminate the 75-ohm female F connectors on the frequency translator.

3. Screw the INPUT and OUTPUT RF cables onto the RF INPUT and RF OUTPUT threaded connectors on the rear of the frequency translator.

CAUTION: Do not overtighten the hex-nuts. Finger tighten only.



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NOTE: These cables may be marked INPUT and OUTPUT. If they are NOT and you do not know which is INPUT and which is OUTPUT, ask your network manager.

4. The DEFTR frequency translator is now fully installed. Proceed as follows:

   a. Advise the network manager that the frequency translator is installed.

   b. See the system manager or go to Chapter 5, Troubleshooting, to verify frequency translator operation.

5.

Troubleshooting

5.1 INTENT

This chapter contains a Network Troubleshooting Table that can be used to identify a problem with a transceiver (DECOM), frequency translator (DEFTR), or broadband network cable facility. Also, a DEFTR Troubleshooting Flowchart is included to test the operation of the DEFTR and/or network cable facility. The table and flowchart are intended for a person who is familiar with the self-test software (such as NI Exerciser) for Ethernet controllers (for example, DEUNA, DEQNA, and DECNA), and networks to which the frequency translator has been connected.

IF YOU NEED HELP, ASK YOUR SYSTEM OR NETWORK MANAGER.

5.2 TROUBLESHOOTING TABLE AND FLOWCHART

- Use Table 5-1, Network Troubleshooting, for a simple method of isolating a network problem to a DEFTR, DECOM, or network cable facility.

- Use the DEFTR Troubleshooting Flowchart to check the operation of the DEFTR frequency translator.

5.3 ETHERNET CONTROLLER SELF-TEST

The flowchart assumes that the Ethernet controller has a loopback test capability (such as NI Exerciser), which can be used to test the translator and network cable facility When the flowchart indicates "RUN ETHERNET CONTROLLER SELF-TEST," run this test on the translator by using the Ethernet controller self-test or functional level testing software. Refer to the user and software documentation for the particular Ethernet controller with which you are working

IF YOU NEED HELP, ASK YOUR NETWORK OR SYSTEM MANAGER

5.4 PRECHECKS

1 Test all transceiver cables and make sure that they work properly, as described in the user documentation for the Ethernet controller

2 Check that the RF cable length from the DEFTR frequency translator to any DECOM transceiver does not exceed 1900 m (6234 ft).

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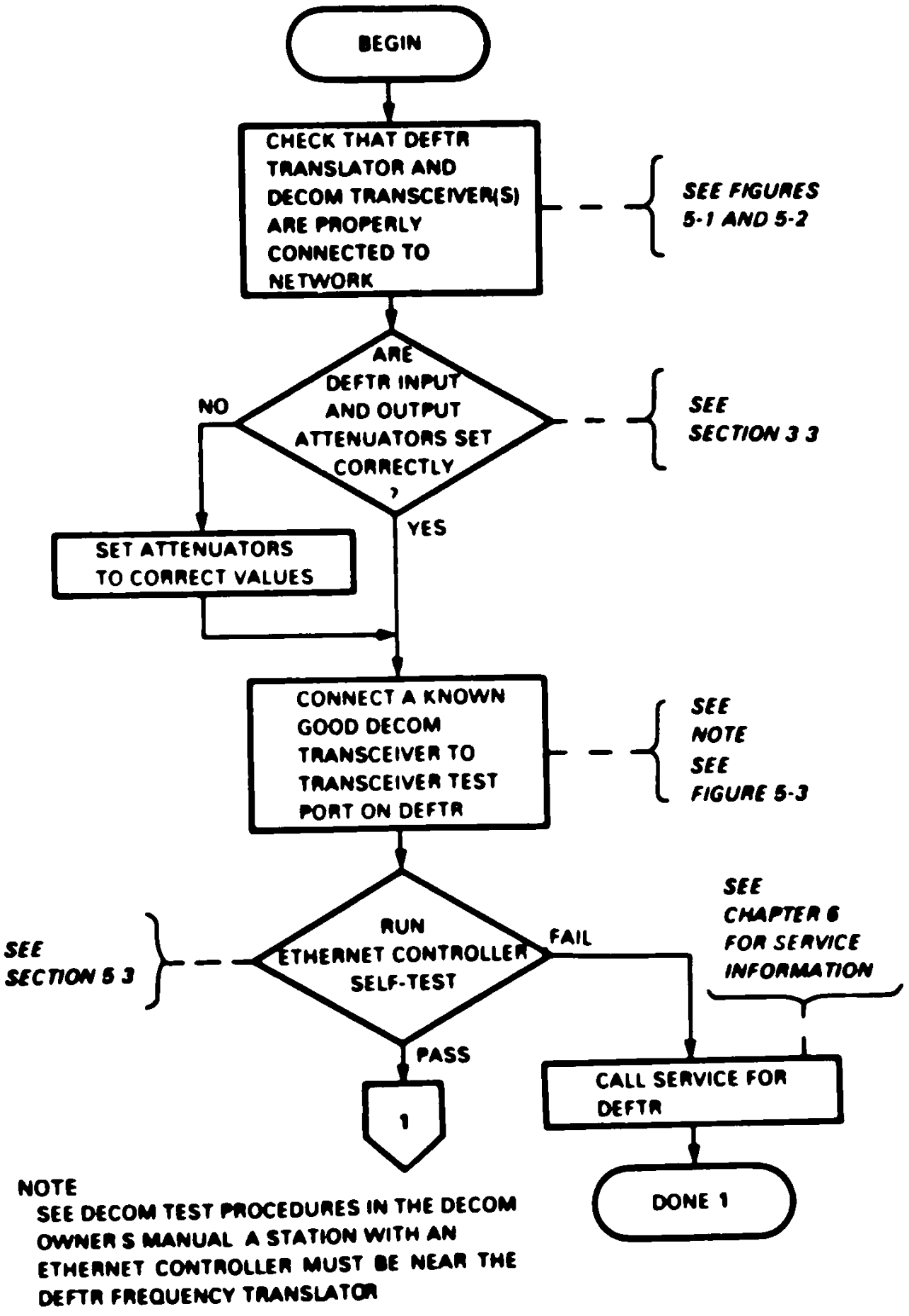
Table 5-1 Network Troubleshooting

Problem	Probable Cause	Remedy
All DECOM transceivers are NOT working and other applications* are NOT working	Network cable facility	Get service for network cable facility.
All DECOM transceivers are NOT working and other applications* are working.	Frequency translator (DEFTR)	Get service for DEFTR or proceed to DEFTR Troubleshooting Flowchart.
Some DECOM transceivers are NOT working.	Network cable facility section	Get service for network cable facility.
	DEFTR attenuator settings	Check settings.
One DECOM transceiver is NOT working	DECOM transceiver	Use checkout flowcharts in the DECOM owner's manual for a more thorough isolation procedure, or get service for DECOM transceiver
	DEFTR attenuator settings	Check settings

*"Other applications" means other datamodems, video equipment, T1 type modems, and so forth, that use the network cable facility as their transmission medium

NOTE Because Digital Equipment Corporation s certification process does not always test every tap in large networks, a 'certified" network may have some taps that are not individually certified After thoroughly checking out the DEFTR frequency translator and DECOM transceiver, see your network manager to find out if the taps being used have been certified

DEFTR TROUBLESHOOTING FLOWCHART


BEGIN
CHECK THAT DEFTR TRANSLATOR AND DECOM TRANSCEIVER(S) ARE PROPERLY CONNECTED TO NETWORK
SEE FIGURES 5-1 AND 5-2
ARE DEFTR INPUT AND OUTPUT ATTENUATORS SET CORRECTLY ?
NO
YES
SEE SECTION 3 3
SET ATTENUATORS TO CORRECT VALUES
CONNECT A KNOWN GOOD DECOM TRANSCEIVER TO TRANSCEIVER TEST PORT ON DEFTR
SEE NOTE
SEE FIGURE 5-3
RUN ETHERNET CONTROLLER SELF-TEST
FAIL
PASS
SEE SECTION 5 3
SEE CHAPTER 6 FOR SERVICE INFORMATION
CALL SERVICE FOR DEFTR
DONE 1
1

NOTE
SEE DECOM TEST PROCEDURES IN THE DECOM OWNER S MANUAL A STATION WITH AN ETHERNET CONTROLLER MUST BE NEAR THE DEFTR FREQUENCY TRANSLATOR

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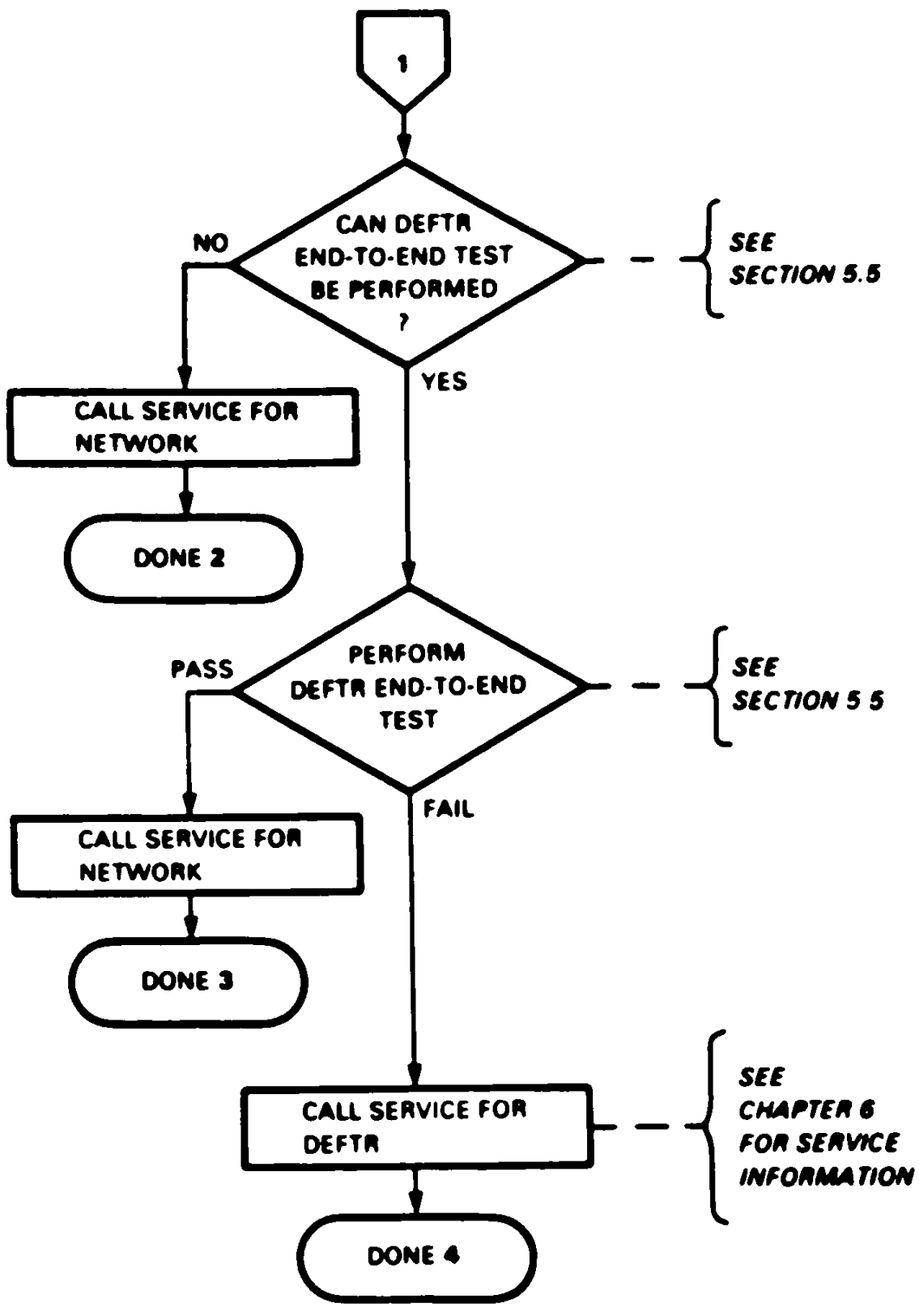
DEFTR TROUBLESHOOTING FLOWCHART (Cont)



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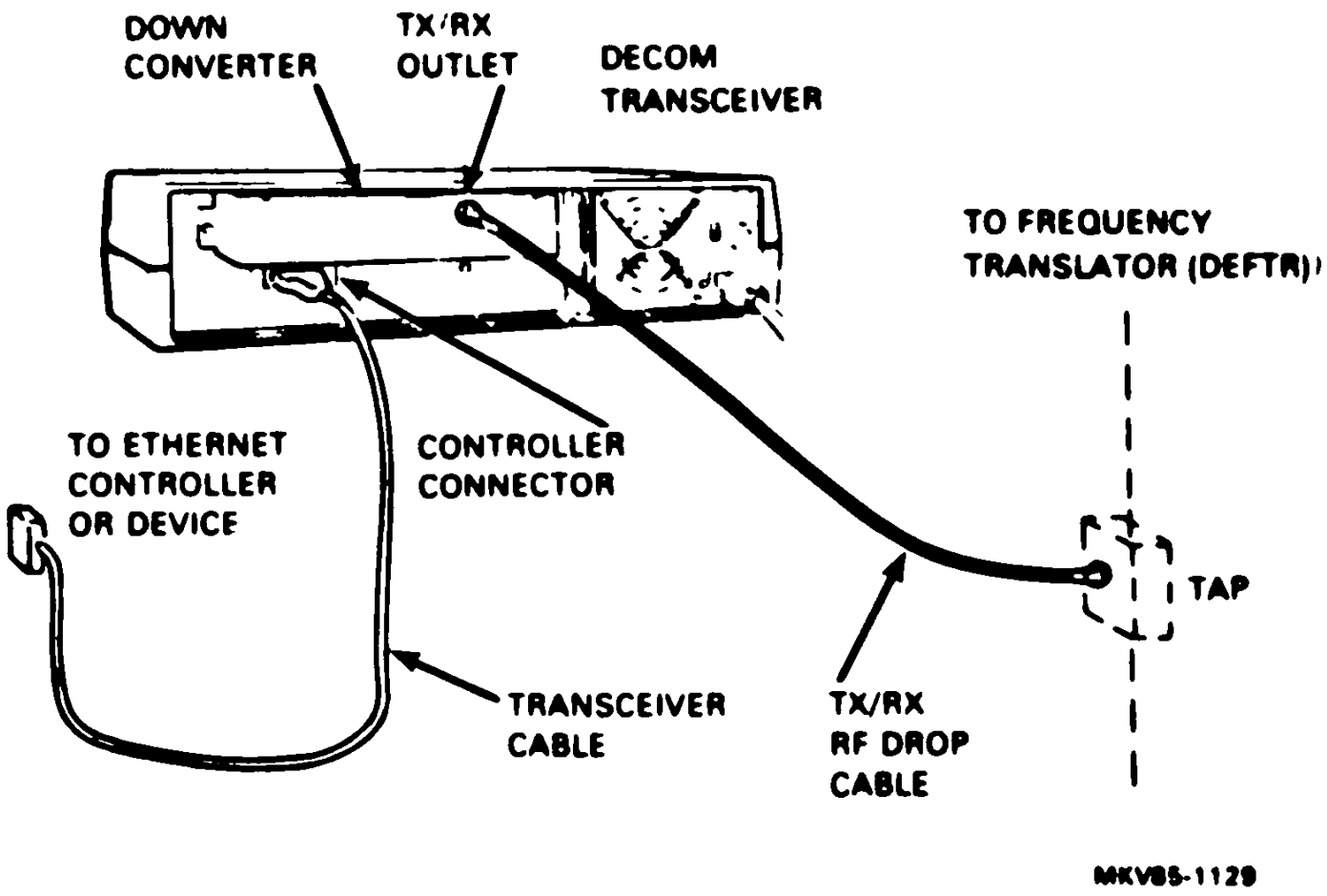


Figure 5-1 Network Connection Diagram for Transceiver

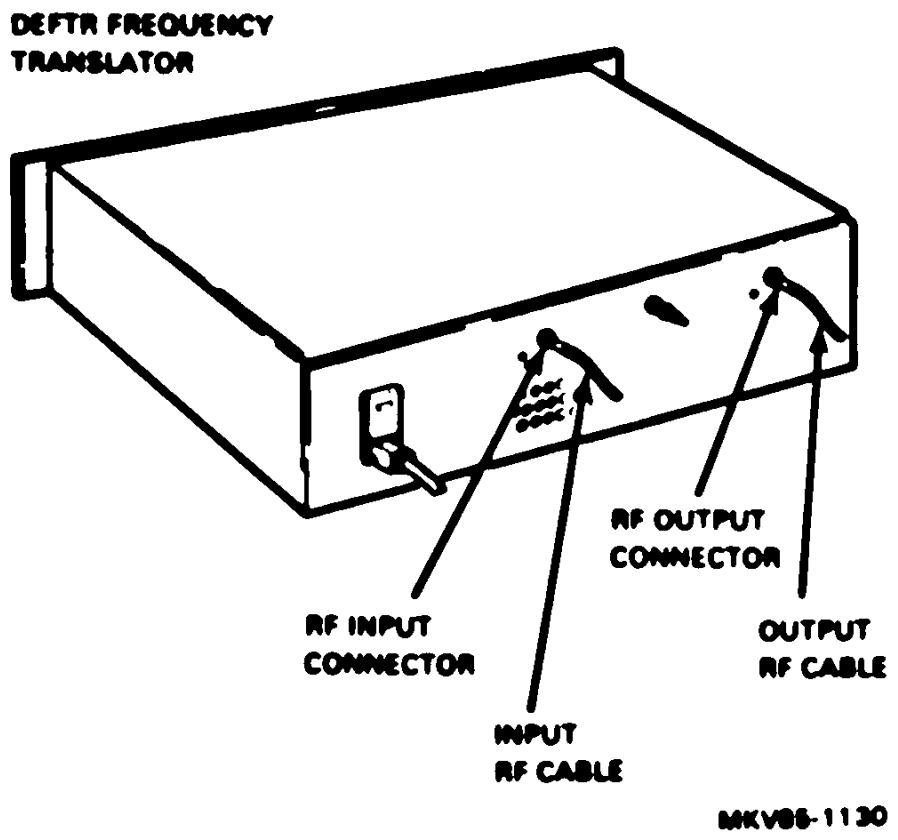


Figure 5-2 Network Connection Diagram for Frequency Translator

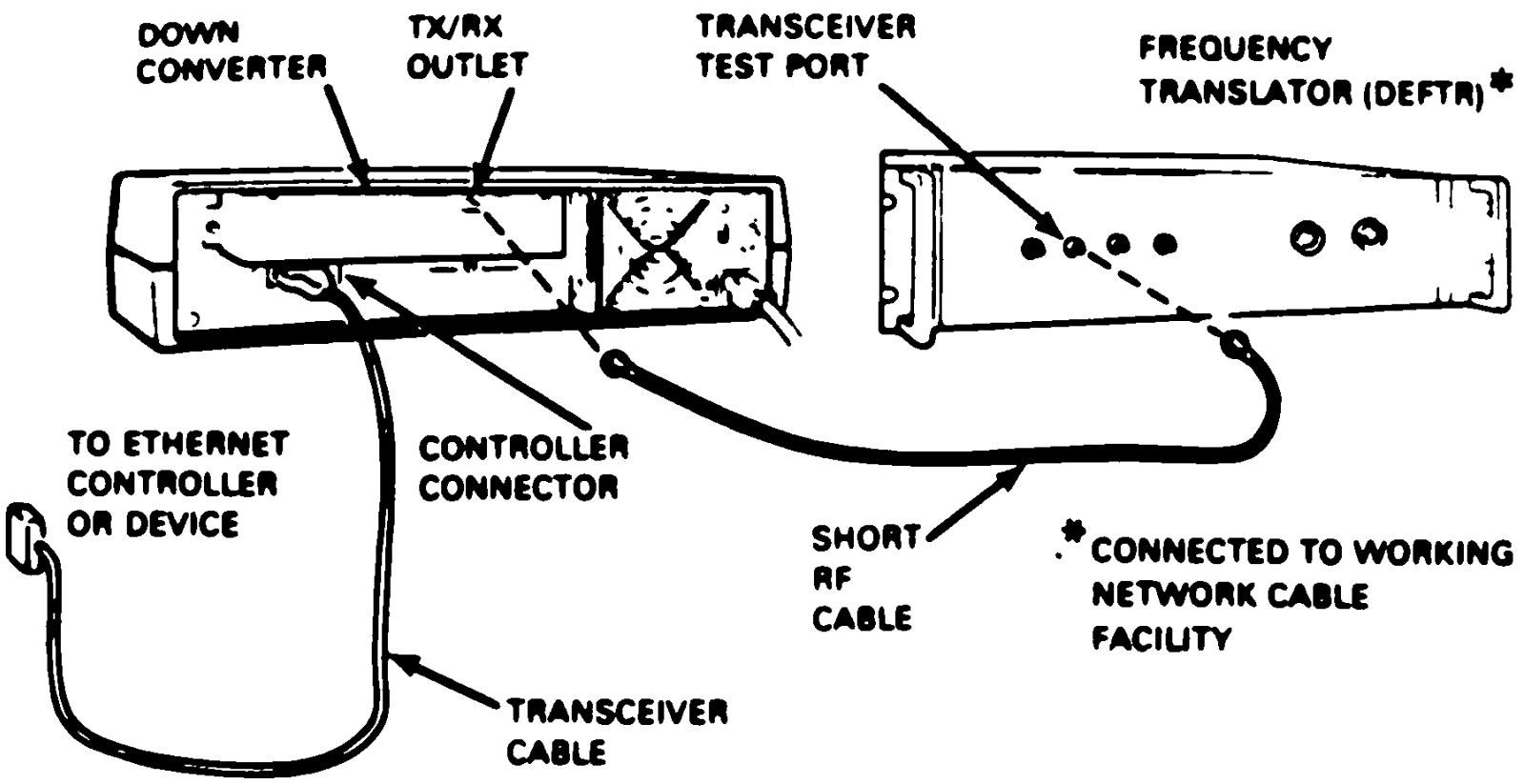


Figure 5-3 Transceiver to DEFTR Frequency Translator Connection Diagram

5.5 DEFTR END-TO-END TEST

This section contains the test referred to when the DEFTR Troubleshooting Flowchart indicates 'PERFORM DEFTR END-TO-END TEST '' The purpose of the test is to determine if the DEFTR frequency translator will accept a known input signal, translate it to a higher frequency, and present this higher frequency signal at the DEFTR output

Required test equipment

- Calibrated signal generator - capable of generating a 60 MHz signal at 0 dBmV into a 75-ohm load

- Calibrated tunable signal level meter - capable of measuring a 222 25 MHz signal in a 34 to 58 dBmV range into a 75-ohm load

Test procedure

1 Disconnect the DEFTR frequency translator from the network by unscrewing the network RF cables from the RF INPUT and RF OUTPUT connectors on the DEFTR

2 Refer to Figure 5-4 Note the settings of the OUTPUT (Forward) and INPUT (Reverse) attenuators on the DEFTR

3 Adjust the signal generator for an output signal of 60 MHz, 0 dBmV into a 75-ohm load

4 Adjust the level meter for an input signal of 222 25 MHz, 56 dBmV.

5 Set the INPUT (Reverse) attenuator on the DEFTR to 0 dB

6 Connect the output cable from the signal generator to the DEFTR RF INPUT connector

7 Set the OUTPUT (Forward) attenuator on the DEFTR frequency translator to 0 dB

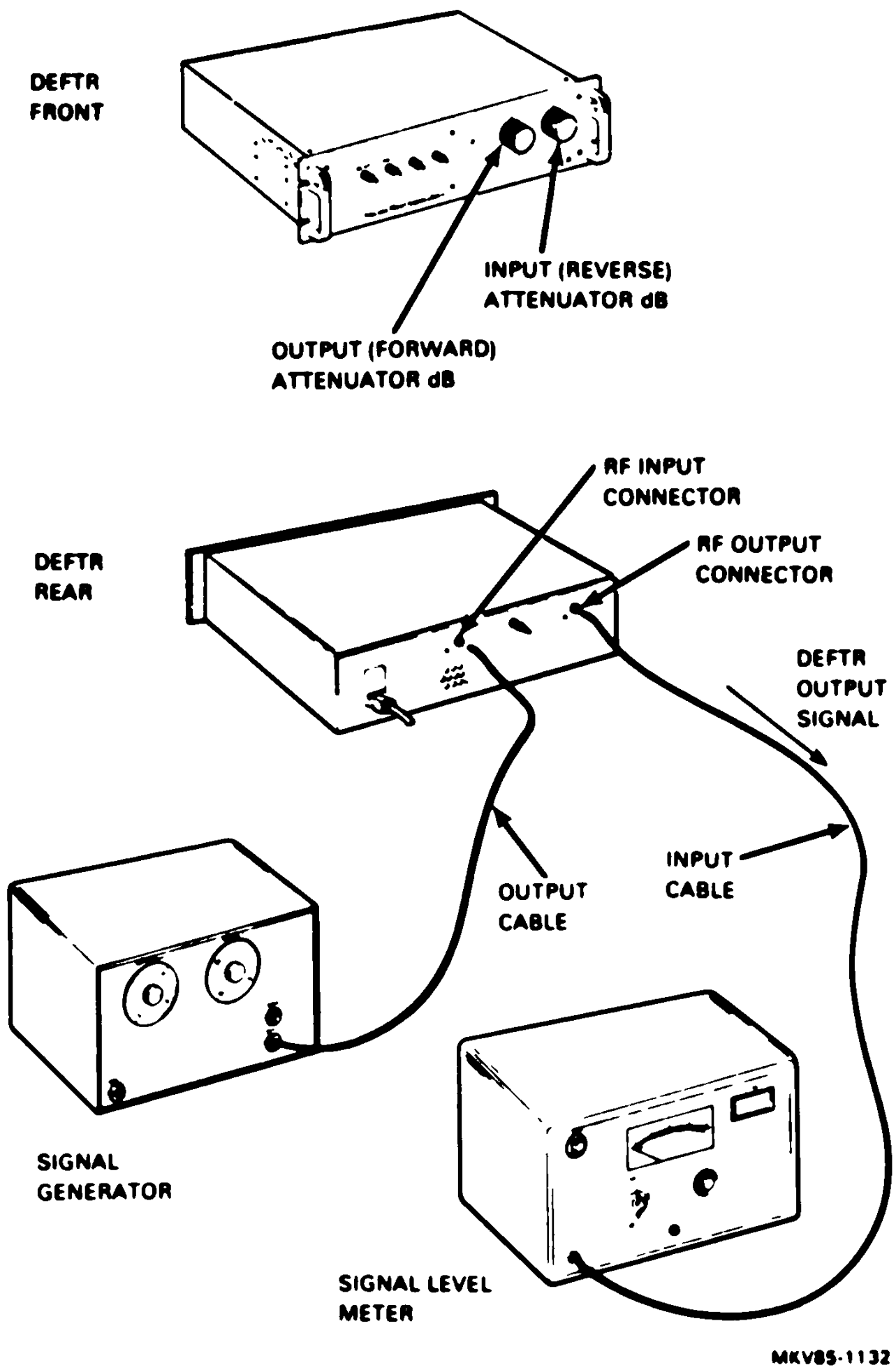


Figure 5-4 Diagram for DEFTR End-to-End Test

8 Connect the input cable from the signal level meter to the DEFTR RF OUTPUT connector.

9 Measure the frequency and level of the DEFTR output signal with the signal level meter

If:	Then:
Frequency = 222 25 MHz and Level = 56 dBmV ±2 dBmV	DEFTR passes test Go to Step 10.
Frequency and/or level not equal to above	DEFTR fails test Return to DEFTR flowchart

10. Set the OUTPUT (Forward) and INPUT (Reverse) attenuators on the DEFTR frequency translator to the values noted in Step 2

11 Measure the level of the DEFTR output signal with the signal level meter

If:	Then:
Level = 56 dBmV ±2 dBmV minus the sum of the OUTPUT (Forward) and INPUT (Reverse) attenuator settings	DEFTR passes end-to-end test. Return to DEFTR flowchart
Level not equal to above	DEFTR fails end-to-end test Return to DEFTR flowchart

6.

Getting Service

6.1 INTRODUCTION

Chapters 4 and 5 describe the steps that you should follow before calling for service. This chapter describes the repair and support services available from Digital Equipment Corporation.

6.2 HOW TO GET SERVICE

To get service for your broadband Ethernet frequency translator, call your local DIGITAL Field Service office.

Before you call:

- Repeat the procedures in Chapters 4 and 5 in this manual. You often can solve a problem yourself.
- Write down the serial number of the frequency translator.
- Summarize the problem. Make a note of what you were doing when the unit failed. Also note the steps you took, and the cables and devices that you switched when troubleshooting.

When you call:

- Be near the unit.
- Have all your information available. The service person may ask you to try to recreate the problem.

6.3 REPACKING THE FREQUENCY TRANSLATOR

If you have to return the unit for service, repack the unit carefully. Use the original shipping carton and shipping material. If you do not have the original shipping materials, pad the sides to prevent damage and keep the unit from moving in the carton.

6.4 DIGITAL SERVICES

Digital Equipment Corporation provides a wide range of DEFTR frequency translator maintenance and customer services.

6.4.1 DIGITAL On-Site Service

Trained service specialists perform fast, low-cost maintenance at your site On-site service is provided under a service agreement or on a per-call basis

6.4.2 DECmailer

If you have troubleshooting expertise but need help for product repair, DECmailer provides a low-cost solution a repair or replacement service for frequency translators with a five-day turnaround at a Customer Return Center.

6.4.3 Spare Parts

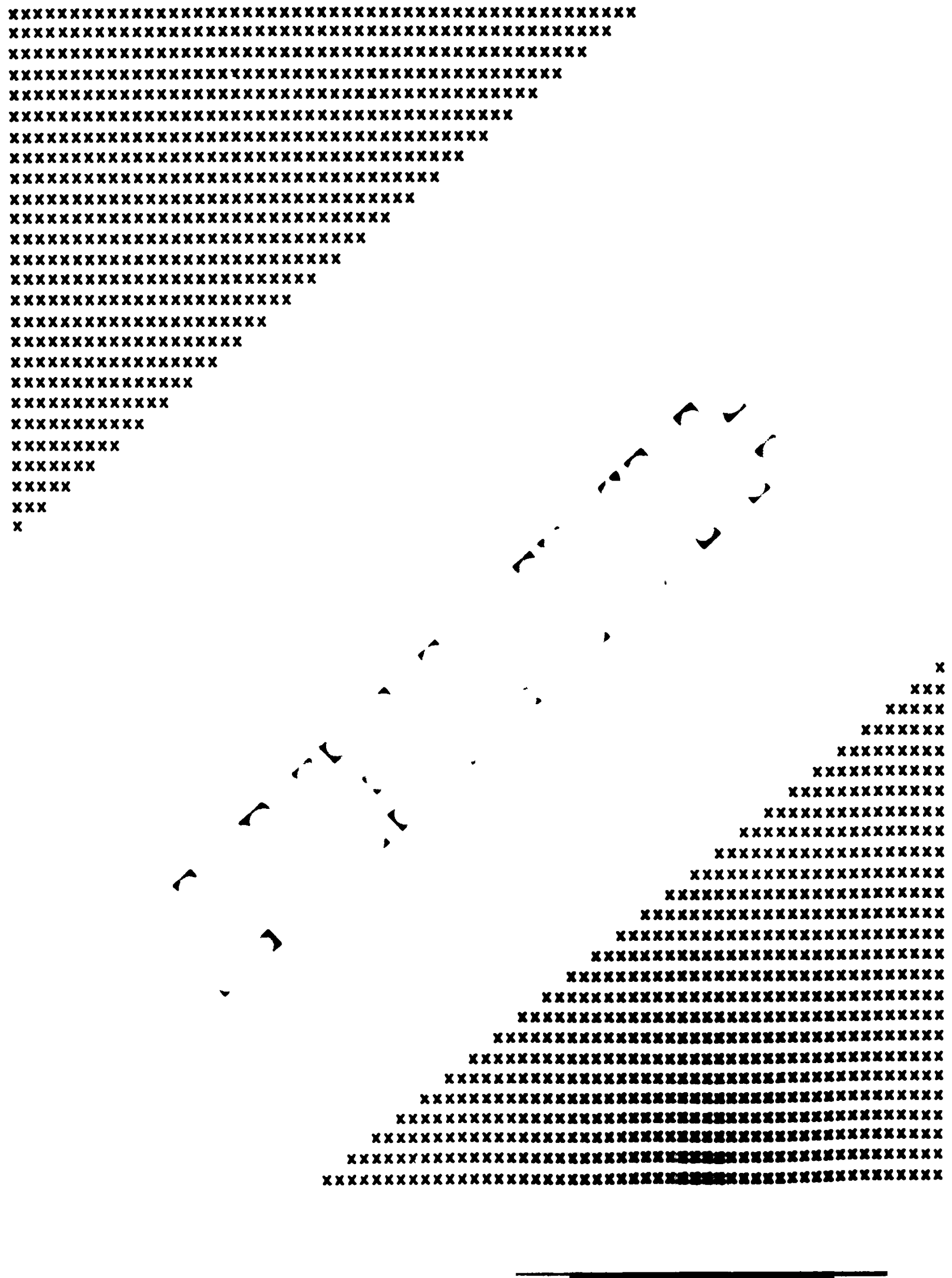
Digital Equipment Corporation s Customer Spare organization provides support in the following areas

- Spare inventory planning
- Maintenance test equipment
- Documentation
- Emergency spare parts

For more information on DIGITAL services, call the service office near you

6.4.4 Other Services

Digital Equipment Corporation also provides network planning services They include site surveys, installation, broadband Ethernet channel certification, and consultations about your network installation There are also network maintenance agreements that can give you support for both DIGITAL equipment and non DIGITAL equipment Call your local sales office for complete information



7.

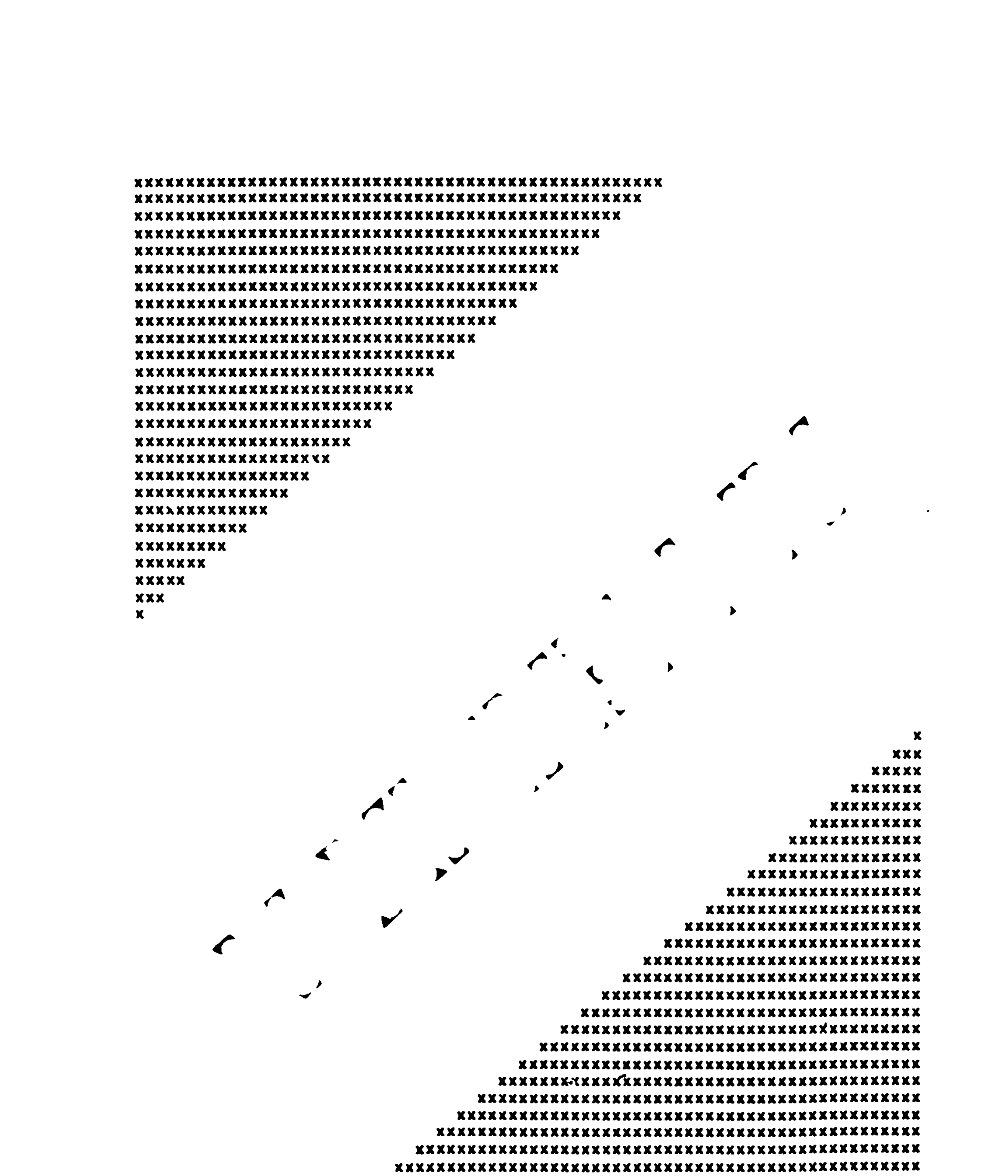
General Specifications

GENERAL SPECIFICATIONS

Overall Size:	13.34 cm (5 1/4 in) standard 48.26 cm (19 in) rack mountable
Weight:	9.07 kg (20 lbs)
Width (excluding front panel):	43.18 cm (17.00 in)
Height:	13.33 cm (5.25 in)
Depth	38.43 cm (15.13 in)
Connectors.	
• Front Panel	Input monitor (type F)
	Output monitor (type F)
	Transceiver test connector (type F)
	Local oscillator monitor (type F)
• Rear Panel	RF input (type F)
	RF output (type F)
	AC power in (IEC)
Levels	
• Input (after input attenuator)	0 dBmV +5 dB
• Output (before output attenuator)	+56 dBmV nominal

GENERAL SPECIFICATIONS

Bandwidth	
• 0.4 dB	56 to 66 MHz minimum
• 1 0 dB	54 to 72 MHz minimum
• .45 dB	48 to 78 MHz maximum
Group Delay Variation.	20 ns peak-to-peak, from 56 to 66 MHz
Translation Frequency.	156.25 MHz (local oscillator at 282.25 MHz ± .005% over the temperature, voltage, and aging ranges)
Noise Figure.	Better than 8 dB at maximum gain
Gain	56 dB ±1 dB maximum at 25°C; ±2 dB over the temperature range
Return Loss.	
• Input	At least 12 dB from 56 to 66 MHz
• Output	At least 14 dB from 209 to 230 MHz
Absolute Delay:	500 ns maximum
Transceiver Test Connector:	
• Input	+50 dBmV nominal
• Output	+6 dBmV nominal
AC Input Power:	
• DEFTR-AA	120 Vac, 60 Hz, 0.29 A, 35 W
• DEFTR-AB	240 Vac, 50 Hz, 0.15 A, 35 W
Fuse	1 A, 250 Vac, fast-blow



A.

Appendix

Front Panel:

INPUT Attenuator	Adjusts the input (reverse channel) signal level to the frequency translator in 1 dB increments from 0 to 10 dB
OUTPUT Attenuator	Adjusts the output (forward channel) signal level of the frequency translator in 1 dB increments from 0 to 10 dB
INPUT MONITOR Connector	Monitors the input signal received by the frequency translator and reduces its level by 20 dB
OUTPUT MONITOR Connector	Monitors the output signal produced by the frequency translator and reduces its level by 20 dB
LOCAL OSCILLATOR MONITOR Connector	Presents the local oscillator output signal (282 25 MHz) and reduces its level by 20 dB
TRANSCEIVER TEST PORT Connector	Provides a means for testing a DECOM transceiver
POWER Indicator	When ON, green LED indicates that the frequency translator is plugged in and ac power is applied

Rear Panel:

RF INPUT Connector	Accepts the RF input signal
RF OUTPUT Connector	Delivers the RF output signal
Unused Connector	———

B.

Appendix

The midrange path (leg) losses for the forward and reverse Ethernet channels are needed to determine the attenuator settings. These path losses are included in the *Ethernet Channel Site Management Guide* or the *Cable Facility Site Management Guide*, which are produced as a result of the certification process. If the midrange path losses are not included in either of these guides, use the following procedures to determine the attenuator settings. If they are included, go to Step 3 in both the input and output attentuator value determinations.

Input (Reverse Channel) Attenuator Value Determination

1. Determine the minimum and maximum reverse signal levels from certification or proof of performance testing performed on the Ethernet channel or cable facility. This information should be in the *Ethernet Channel Site Management Guide* or *Cable Facility Site Management Guide*.

2. Determine the midrange of the reverse path loss by using the following formula:

   Midr = LTSA – (Minr + Maxr)/2

   Where:

   Midr = Midrange reverse channel path loss (dB)
   Minr = Minimum reverse channel signal level (dBmV) at 61 MHz
   Maxr = Maximum reverse channel signal level (dBmV) at 61 MHz
   LTSA = Level of test signal asserted (dBmV)

3. Determine the input attenuator setting by using the following formula.

   Input Attenuator Setting = 50 - Midr

NOTE If the input attenuator setting is a negative value, set the input attenuator to 0 dB If the input attenuator setting is between 10 and 13 dB, set the input attenuator to 10 dB.

Output (Forward Channel) Attenuator Value Determination

1. Determine the minimum and maximum forward signal levels from certification or proof of performance testing performed on the Ethernet channel or cable facility. This information should be in the *Ethernet Channel Site Management Guide* or *Cable Facility Site Management Guide*.

2 Determine the midrange of the forward path loss by using the following formula:

Midf = LTSA (Minf + Maxf)/2

Where

Midf = Midrange forward channel path loss (dB)
Minf = Minimum forward channel signal level (dBmV) at 221 MHz
Maxf = Maximum forward channel signal level (dBmV) at 221 MHz
LTSA = Level of test signal asserted (dBmV)

3 Determine the output attenuator setting by using the following formula

Output Attenuator Setting = 50 - Midf

NOTE If the output attenuator setting is a negative value, set the output attenuator to 0 dB If the output attenuator setting is between 10 and 13 dB, set the output attenuator to 10 dB.